

# The Mining Journal

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## In this issue . . .

Floating Exchange Rates . . . . .	191
The Ptolemais Lignite Project . . . . .	192
New Italian Gold Producer ? . . . . .	192
Hyderabad's Diamond-Bearing Rocks . . . . .	192
Theory of Blast Furnace Zinc Production . . . . .	193
The Changing Pattern of Steel Production . . . . .	195
Central Coal Preparation Plant in India . . . . .	196
Machinery and Equipment . . . . .	198
Mining Miscellany . . . . .	199
Metals and Minerals . . . . .	200
London Metal and Ore Prices . . . . .	201
Mining Finance . . . . .	202
Company Meetings . . . . .	203, 204

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## Floating Exchange Rates

**L**AST week-end the French Finance Minister imposed a tax of 20 per cent on all imports except raw materials, a 20 per cent subsidy on all sales abroad, and a 20 per cent differential rate for tourists and for other financial transactions. Notwithstanding these changes the official rate was left unchanged at Frs.980 to the £.

The official French version explaining these measures was that external payments could be placed on a more satisfactory basis by introducing the present system of import taxes and export subsidies, and consequently, the former rates for the French franc in terms of other currencies could be left unaltered. Whatever may have been the reasons of the French authorities for avoiding a formal declaration of outright devaluation—and the prevention of a sudden rise in prices and wages is one—the U.K. interpreted the announcement as a *de facto* devaluation of the franc and by mid-day on Monday the Bank of England altered the sterling—franc parity from 980 to 1,176 to the £ and adjusted the official dealing range for the French franc in the London market accordingly.

It has been clear for some time that several European currencies have been out of line with each other and although this problem would doubtless have been thoroughly discussed at the I.M.F. meetings six weeks hence the recent run on the French currency flashed a warning light the French Government could not ignore. It may have come as somewhat of a surprise to find the I.M.F. agreeing to the establishment of differential rates of exchange, but it could hardly do otherwise and, in any event, it must by now be viewing the step taken by France as merely the first move in what promises to become a determined effort to realign European exchange rates on a more realistic basis.

In one way the root of the trouble lies somewhere between the overvaluation of the French franc and the undervaluation of the German mark, with sterling acting as the linchpin in keeping the values of the currencies ranging between the franc and the D-mark on a more or less workable basis. However, the weakness of the franc has accentuated the strength of the German mark and accordingly there has been a flight of European funds into Western Germany in the belief that sooner, rather than later, the value of the German mark in terms of the dollar would be increased. By the same token sterling has come under pressure on the grounds that France's action has brought devaluation one step nearer. While it may be true to say that the pound is overvalued in terms of purchasing power with the German mark, the strength of sterling in the free market does not indicate that this is so in terms of the dollar.

What solution will be found to place a more realistic value on various European currencies is difficult to perceive. General devaluation in terms of the German D-mark must qualify as one solution, but in the long run, this would result in the hopeless position of scarce dollars, even scarcer D-marks, and diminishing gold supplies through hoarding, attempting to function as an international clearing house for trade. There would be many who would aver that the only solution would be to raise the gold price.

This at least would have the merit of facilitating the underwriting of international trade if the price of gold was raised to a sufficiently high level. On the other hand, without bringing basic exchange rates on to a more realistic level in the first place, additional gold cover by raising the gold price could only be a temporary stopgap. Perhaps the most practical solution would be to allow the various European exchange rates to float within reasonably wide limits and at a subsequent date give the international trading scene a healthy shot in the arm by raising the gold price.

Time alone will tell how the present crisis will be resolved. But one way and another it seems likely that gold will regain a great deal of its former lustre. Indeed, had it not been for the strength of the D-mark the flight from the franc into gold would have been even more marked. As it was, the rise in the volume of trading on the Paris gold market on one day reached some Frs.1,500,000,000 with the gold Louis changing hands at about Frs.4,000, the highest price attained since the last financial crisis in 1952.

### THE PTOLEMAIS LIGNITE PROJECT

On July 27, King Paul of Greece laid the foundation stone of a lignite mining project on which, it is hoped, a chain of industries worth over £50,000,000 will be established in six years. The project, at Ptolemais in north-west Greece about 25 miles south of the Yugoslav border, is expected to be finished early in the summer of 1959. The resources of lignite are estimated at about 450,000,000 tons of proved deposits with the probability of another 120,000,000 tons and a possible 100,000,000 tons.

The Ptolemais Lignite Mining and Industrial Co. was granted a 40-year concession in June, 1955, for the exploitation of the lignite fields over an area of 110 sq. km. After its expiry, all plant and equipment will become the property of the state. The company undertook to build all the plant that might be required to guarantee each year the extraction of at least 1,800,000 tons of lignite, the production from this lignite of at least 200,000 tons of briquettes, and the production of 100,000 tons of low-temperature coke. The chairman of Ptolemais Lignite is Mr. Bodossakis-Athanassiadis.

The company will have assured markets for its products, at least in the opening stages. A minimum of 900,000 tons of lignite will be consumed annually by the thermal power station to be erected on the site by the Greek Public Power Corporation, the principal producer and distributor of Greek electric power. The Greek State Railways has guaranteed an annual purchase of 120,000 to 150,000 tons of lignite briquettes. About 100,000 tons of low-temperature coke are needed for the smelting at Mr. Bodossakis-Athanassiadis' nickel works at Larymna, in central Greece.

The Ptolemais mining and industrial project (excluding the PPC plant) will cost \$20,929,000. Of this, \$13,836,000 will be provided by the State as a loan through the Economic Development Finance Organization; \$3,000,000 will be the company's share capital; and \$4,093,000 will come from German credits to Greece. Capital repayment of this last sum is to be made within seven years of completion of the project at 6 per cent interest rate. Servicing of the loan will begin six months after the plant has started operations. Krupps of Essen are acting as technical advisers at 2½ per cent commission. This firm will also share in tenders for the supply of the necessary machinery.

Actual operation of the works will be timed to coincide with the functioning of the PPC power plant. An average of 2,000,000 tons of lignite will have to be mined a year. The PPC power plant will have an installed capacity of

60,000 kW. net and it is estimated that it will consume between 900,000 and 1,100,000 tons of run-of-mine lignite each year. The briquetting plant will require about 700,000 tons of lignite to produce 200,000 tons of commercial briquettes and about 160,000 tons of briquettes for low-temperature carbonization. The company's own power station, which will have an installed capacity of 8,000 kW., will consume about 250,000 tons of lignite.

The project, it is hoped, will also make possible the supply of dry lignite to the planned nitrogen fertilizer factory which the government has placed at the head of its industrial programme. Establishment of this factory would save \$18,000,000 foreign exchange annually.

### NEW ITALIAN GOLD PRODUCER ?

The Italian Mining Authority recently announced that the gold mines on the slope of Alagna Sesia Mountain are to be reopened.

The Valsesia mines, producing high-grade auriferous galena, have been exploited by various private companies since their discovery in 1560. The last concessionaire, the New Monterosa Mining Co., a British corporation, operated the mines from 1894 to 1931 when operations ceased owing to the depletion of high-grade ore. During this period the company reportedly produced about 50 tonnes of concentrate per day. The average yield was about 1 kg. of fine gold per ton.

In accordance with an announcement in the *Gazetta Ufficiale* of September 22, 1956, the company applied for, and has been granted, a 10-year extension to the concession. As soon as the railroad from Alagna to the mines is restored and processing plants reconstructed, the company expects to begin exploitation of the new veins discovered during the last two years. It is estimated that the mines will employ 200 persons to produce about 100 tons of the concentrate per day, which is expected to yield 2½ kg. of gold.

### HYDERABAD'S DIAMOND-BEARING ROCKS

The Geological Survey of India has suggested some preliminary prospecting operations on a modest scale in the diamond-bearing rocks of the former Hyderabad State in order to explore the possibilities of resuming this exploitation. A survey has shown that all the diamond-bearing rocks in Hyderabad may not have been exhausted, reports our correspondent.

According to the recommendations of the geologists, mere surface examination will not give much useful information. The diamond-bearing rocks will have to be quarried. A number of trial pits might be put down in and near some of the old workings.

It is emphasized in the report that although the prospecting operations will be speculative ventures, the high price of diamonds and the improved methods of mining and washing machinery that can be commanded warrant that some of the areas at least should be explored.

Various probable reasons have been ascribed for the decline of the diamond mining industry in this area. These include exhaustion of diamond-bearing rocks, water trouble in the excavations, absence of systematic prospecting operations, belief in various kinds of superstitions and discovery of diamond fields in other parts of the world.

## ZINC PRODUCTION—II

## Theory of Blast Furnace Zinc

## Production

**T**WO pilot production furnaces were built at Avonmouth, one with a nominal capacity of 20 tons of zinc output per day, the other of 25 tons per day. The design of these units was undertaken at a relatively early stage in the development of the small experimental furnace, and modifications of the units have followed the major changes in experimental development. As a result the furnaces now have capacities of 30 and 40 tons per day respectively and between them have produced more than 70,000 tons of zinc.

The furnaces have a water-jacketed bottom section, with water-cooled tuyeres, and a brick-lined top shaft. The smaller furnace has 16 tuyeres and a hearth area of 55 sq. ft.; the larger, 20 tuyeres and an area of 69 sq. ft. The tapped slag is granulated; with the development of zinc-lead smelting, arrangements for collection of matte and bullion in an external settler have been added. The hot zinc-containing gases are withdrawn above the furnace charge; the furnace top is totally enclosed, batch charges being introduced via a double-bell system.

The gas from each furnace passes to two condensers, one on each side of the furnace. In each condenser there are three vertical shaft rotors in series, dipping in successive stages of the lead pool in the bottom of the condenser. The rotor creates an intense shower of lead droplets, which

By S. W. K. MORGAN

cools the gas to a temperature near that of the lead. By disposing the rotors in successive stages, with an appropriate lead flow countercurrent to the gas stream, the gases leaving the furnace are rapidly chilled below 600 deg. C. and further cooled to about 450 deg. C. before they leave the condenser. The uncondensed zinc leaving the condenser in the gas is thereby reduced to below 5 per cent of the total entering the condenser.

The gas is further scrubbed, first in a spray tower, then in Theissen-type disintegrators; the scrubbed gas (C.V. 70-80 B.Th.U/cu. ft.) is used on the plant to preheat air and charge, and the surplus burned in boilers. The water from spray towers and disintegrators passes to a Dorr thickener to recover the blue powder, which is filtered before return to the sinter machine charge.

On each condenser lead is pumped at a rate of 300-400 tons per hour round a circuit comprising the condenser, a pump chamber, a long water-cooled launder and a separation bath. Control of heat removal is effected by varying the area of water-cooled surface immersed in lead, and adjustment of temperature differential between the hot and cold ends of the condenser by alteration of lead pumping rate. The launders cool the lead stream to about 450 deg. C.; cooling is completed in the separation bath in which the liquid zinc separates as a top liquid layer. By suitable disposition of overflow levels for zinc and lead, a zinc layer approximately 15 in. deep is maintained on the bath, and this zinc overflows continuously into a bath for reheating and for treatment with sodium to remove arsenic. The cold lead returns continuously to the condenser.

A process for smelting zinc in a blast furnace has been developed by the Imperial Smelting Corporation Ltd. after 25 years of study, and two furnaces with a total daily zinc production of 70 tons, are now in operation at Avonmouth. In our issue of August 9, 1957, the experimental work that pioneered the process was discussed, while in the concluding article appearing herewith, the pilot production furnaces and the theory of the process are described. The article is condensed from Bulletin of The Institution of Mining and Metallurgy, Vol. 66, Part II.

The zinc produced is of G.O.B. or Prime Western Grade and assays as follows:—

Pb 1.2 p.c.; Fe 0.024 p.c.; Cd 0.07 p.c.; As 0.001 p.c.

Slag, matte and bullion are periodically tapped from the furnace, the matte and bullion being retained in an external settler, the slag passing on to a granulating system. The slag composition varies somewhat with the type of gangue in the concentrates treated. Its zinc content may range between 1 per cent and 5 per cent, but with close control of charge composition and proportioning, steady running with a zinc content of 2-3 per cent can be consistently maintained. The lead content of the slag is about 0.5 per cent, depending mainly on the efficiency of separation in the forehearth.

The air blast is heated in alloy tube recuperators fired with scrubbed furnace gas; the heaters installed at present allow a maximum preheat of 550 deg. C. The charge is heated in a vertical shaft with a countercurrent stream of burned furnace gas; automatic control arrangements ensure provision of a neutral mixture of gas and air, with sufficient recycle of the gas leaving the charge preheater to prevent overheating and slagging at the base.

The process lends itself to the instrumental and automatic control, and this aspect has been exploited. The furnace is operated at constant controlled blowing rate, and the gas leaving the furnace is split between the two condensers by automatic damper control.

## Theory of the Process

Considering first the elimination of zinc from the furnace charge, the amount of zinc produced per unit of carbon burned is governed by the heat balance. The input of heat is the sum of:—

- (a) the heat of combustion of carbon partly to CO, partly to CO<sub>2</sub>;
- (b) the sensible heat of preheated air and preheated charge.

The heat is consumed in:—

- (a) slag melting;
- (b) heat losses;
- (c) sensible heat of gases leaving the furnace (at a temperature not greatly removed from the equilibrium condition for the reaction  $\text{CO} + \text{ZnO} = \text{CO}_2 + \text{Zn}$ );
- (d) endothermic reduction of zinc oxide by carbon monoxide;
- (e) reduction of carbon dioxide  $\text{CO}_2 + \text{C} = 2\text{CO}$ .



A heat balance drawn up in this way clearly depends markedly upon the actual level of  $\text{CO}_2$  in furnace gas achieved in the operation; the higher the percentage of  $\text{CO}_2$ , the more zinc oxide can be reduced per unit of carbon. The level of  $\text{CO}_2$  is dependent upon a complex of conditions, including the temperature of the primary combustion zone, the depth and temperature of the charge column, the reactivity of coke (in reducing carbon dioxide) and of the zinciferous charge (producing carbon dioxide). A typical operation yields gas leaving the charge containing 5-6 per cent zinc vapour, 8-10 per cent  $\text{CO}_2$ ; such gas has an equilibrium re-oxidation temperature of 960-1,000 deg. C.

The heat balance, and thus the amount of zinc eliminated per unit of carbon, is obviously influenced by the heat content of the air blast and by the actual magnitude of heat losses to water-cooled tuyeres and jackets. If extra heat is made available by raising air preheat or by measures to reduce heat losses, the ratio of zinc to coke in the charge can be increased; if the zinc-coke ratio is kept constant, some of the extra heat is utilized in reducing the zinc content of the slag, but most of it is absorbed in reducing carbon dioxide.

Decreasing the amount of zinc left in the slag by increasing the coke-zinc ratio (and thereby increasing the ratio of carbon monoxide to carbon dioxide) is undesirable, not only because it reduces the zinc throughput, but also because the furnace gases must not be made so reducing that high-melting metallic iron is formed at the bottom of the furnace.

On the other hand, particularly if much arsenic is present, it is desirable that the  $\text{CO}/\text{CO}_2$  ratio in the hearth zone of the furnace should approach that at which metallic iron is reduced, so that an iron-rich speiss (with a high thermodynamic activity of iron and a low activity of arsenic) can be formed. Since the thermal economy of the furnace is improved by decreasing the  $\text{CO}/\text{CO}_2$  ratio, requirements are best met if the slag composition is such that its iron oxide activity is high and the activity coefficient of zinc oxide is high.

Rather poor zinc elimination is obtained with the type of slags generally used in lead smelting, but a low zinc content of slag is obtained by increasing the lime content; the lime can be added either at the furnace or in the charge to the sinter machine. Good zinc elimination is further favoured by the use of a reactive and porous sinter, and by ensuring an even charge distribution in the furnace.

### Aspects of Fuel Consumption

The ratio of fuel burnt to zinc volatilized therefore depends on a number of factors such as the temperatures to which the air blast and the charge are preheated, the heat loss from the furnace, and the amount of slag-forming materials present. On a typical furnace, with charge preheated to 800 deg. C., and air blast to 600 deg. C., the carbon consumption may be calculated as the sum of 90 per cent of the weight of zinc to be volatilized, and 20 per cent of the weight of slag to be formed. With a high grade mixed zinc-lead concentrate in which the weight of the slag formed may be 70 per cent of the weight of zinc present, this means that the carbon consumed might be about 104 per cent of the weight of zinc reduced and volatilized.

The coke consumption of the blast furnace is greater than the producer coal used in the best vertical retort practice, but less than the total coal consumption in producers and in briquette charge to the retorts. The reasons why the coke consumption on the blast furnace is greater than the nominal fuel consumption on the vertical retorts are: firstly, the carbon monoxide formed by the retort reaction

is utilized as a fuel for the retorts; secondly, a large amount of sensible heat is removed from the blast furnace gases in the condenser; and thirdly, there is still obtained an excess of blast furnace gas, the calorific value of which represents about 25 per cent of that of the coke burned.

In condensing the zinc content of the furnace gas the primary object is to prevent the re-oxidation reaction,  $\text{CO}_2 + \text{Zn} = \text{CO} + \text{ZnO}$ , by shock chilling. Rapid cooling tends to promote fog formation but the seriousness of this aspect is lessened by:—

- (a) the high superheat of the gases, which have a dew point of about 650 deg. C. and leave the furnace at 900-1,000 deg. C.;
- (b) the presence of a rain of unsaturated lead in which droplets of zinc are formed, but are themselves scrubbed by the intense rain of lead.

In condensing a gas containing 5 per cent Zn, by counter-current scrubbing with cold liquid lead saturated with zinc, the quantities of heat and zinc are such that the lead becomes unsaturated, as it becomes hotter. A typical situation would be:—

Cold lead 440 deg. C.; 2.02 per cent Zinc (saturated);  
Hot gas 5 per cent Zinc, 1,000 deg. C., to be cooled to 450 deg. C.;

Hot lead 570 deg. C.

The quantity of lead required by the heat balance is such that it rises only 0.24 per cent in zinc content and leaves, therefore, containing 2.26 per cent Zn, compared with a saturation value of 4.9 per cent Zn. Lead has to be circulated at a very high rate —  $\frac{100}{0.24} = 420$  times the rate of

zinc production, in order to maintain this situation.

Under favourable conditions, about 89 per cent of the zinc vapour entering the condenser is condensed and recovered as molten metal. The remaining 11 per cent of the zinc vapour is recovered in the dross periodically removed from the condenser and in the blue powder washed out of the condenser exhaust gases. Both the dross and blue powder contain lead. Typically, the blue powder contains 32 per cent zinc and 45 per cent lead, and the dross 43 per cent zinc and 36 per cent lead.

The reduction of lead oxide by carbon monoxide is slightly exothermic and, since this is, in fact, the reaction by which lead oxide is reduced in the furnace, the lead content of the furnace charge makes no demand upon the carbon, which is calculated in terms of the zinc to be eliminated and the slag to be melted. This feature of the process whereby lead is a "passenger" has been confirmed in the smelting of many zinc-lead charges. This effect is gained at the expense of a higher carbon dioxide content of the gas, but satisfactory condensation can still be attained. The condenser gas with high lead charges may contain 11-12 per cent  $\text{CO}_2$ , with 17-19 per cent CO, its calorific value being thus only about 60 B.Th.U. per cu. ft. It is still more than sufficient for preheating the charge and air blast; about half the total gas produced is available for other uses.

Most of the arsenic present in the charge can be tapped as a speiss from the surface, but some of it is volatilized and collected with the zinc metal, from which it can be removed by treatment with sodium. When lead is being tapped from the furnace, it collects nearly all the antimony; any volatilized antimony that is collected with the zinc metal is removed by the sodium treatment. When sufficient sulphur is present, a matte is tapped from the furnace hearth.

The process provides a method for treating a variety of zinc-bearing materials to yield metallic zinc.

# The Changing Pattern of Steel Production

**T**O a greater extent than ever before, British steel makers are enlisting the aid of science in the evolution of new techniques to meet the changing requirements of the atomic age, and to provide the special types of steel required in an era when supersonic speed has become a commonplace.

In the penetration of this realm of applied science the U.K., of course, is not alone. The fantastic expansion of the American steel industry whose present production capacity exceeds that of Soviet Russia, Germany, the U.K. and France, has only been made possible by an equal devotion to scientific principles evolved in the laboratory and the research stations and it is a happy circumstance that between the technicians of the U.S. and the U.K. there has been a free interchange of information on the subject of new methods of stream-lined production.

## Latest U.S. Practices

Thus it is pleasing to observe that the current number of *Steel Review* is chiefly devoted to a detailed examination of the latest practices in American steel production and an attempted survey of the possible lines of future development.

C. M. Parker, the writer of an article on technological trends, believes that the growing use of imported ores in American blast furnaces, which has become a necessity owing to the inadequacy of supplies from home sources, will lead to decisive changes in blast furnace practice.

Labrador ores, for example, which contain 54 per cent iron and only 5 per cent silica, increase blast furnace production by about 10 per cent while decreasing consumption of lime and coke with consequent decrease in slag volume. Venezuelan ores, which are also used in growing quantities, are high in iron and alumina content but low in silica and require dolomites for fluxing to add magnesia to the slag.

The growing use of sinter and other beneficiated forms of iron ore is common on both sides of the Atlantic, though perhaps it is further advanced in the U.S. where it is expected that sinter capacity will reach 63,000,000 net tons by the end of next year.

In the operation of the blast furnace, the principal lines of experiment have been based on the introduction of steam or oxygen, or both, into the blast, and the pre-heating of the blast above conventionally accepted temperatures. It is thought that the injection of steam gives more uniform blast composition, increases the quantity of hydrogen available for reducing ore, and results in a smoother working furnace.

Oxygen enrichment is not confined to blast furnace practice. On the contrary, a good deal of attention has been focused on a new basic high purity oxygen steel converter which has been introduced into the U.S. from Austria. At present only one such plant is operating, but two more are building, and Mr. Parker states that before the end of the year, capacity may exceed 2,000,000 tons.

These plants at present under construction are, of course, merely supplements to the larger open hearth steel plants, but their performance will be closely watched and if present claims are substantiated by subsequent performance, it may well be that the high purity oxygen processes will force changes in the specifications for finished steel products.

In any event, open hearth operators are by no means inclined to ignore the value of oxygen in improving the efficiency of the furnaces and it is interesting to learn that oxygen requirements have increased from 30 cu. ft. per ton of steel produced in 1930 to 250 cu. ft. per ton in 1956.

In America, as in Britain, the use of the electric furnace is also developing rapidly. Last year U.S. electric furnace capacity had reached 11,000,000 tons and further substantial increases are planned, and it is said to be only a matter of time for the development of bigger furnaces with capacities ranging up to 250 tons.

What of the future? In the same publication, B. F. Fairless, president of the American Iron and Steel Institute, and president also of the United States Steel Corporation, the world's greatest steel producing company, attempts to answer this intriguing query. For his own country he foresees an era of capacity expansion on a still more grandiose scale.

In 1956 U.S. steel companies added nearly 5,100,000 tons of ingot capacity involving an outlay of \$1.2 billions. This year they plan to spend a further 1.7 billions, and estimate that in the next 15 years capacity will have to be increased by about 4,000,000 tons a year to reach a target of 185,000,000 tons in 1970.

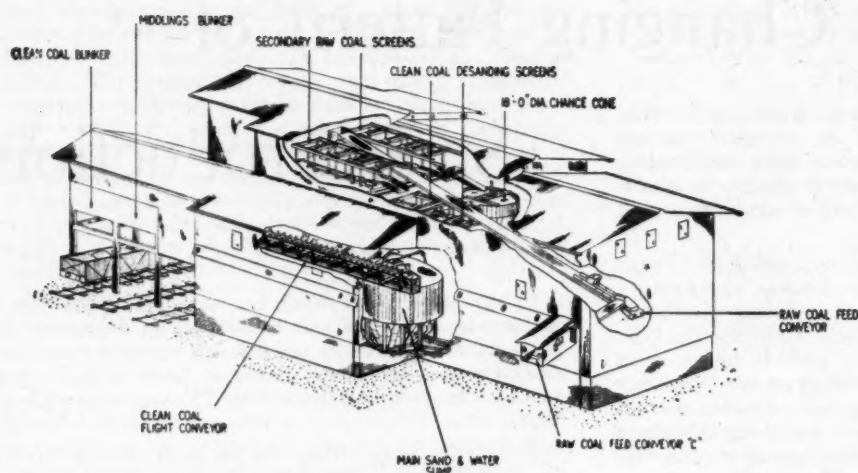
## Possible Future Developments

Already embarked on what he calls "the jet age, the rocket age, and the atomic age" he foresees developments in the production of special steels beyond our present comprehension. "The steel mills of the future . . . will utilize sources of power, chemicals, electronic controls, and varieties of materials that we are just beginning to investigate. We anticipate that their output will include plastics, chemical derivatives, titanium, and new families of alloys constituting as much as 50 per cent of total production.

"Steel will be made by direct reduction of iron ore perhaps using atomic energy. Iron ore will run in at one end of the plant and finished steel products will emerge at the other, without intermediate processes such as soaking, conditioning, hot rolling, annealing, pickling and shearing. Many of the finished products will be continuously cast or extruded instead of rolled.

"We in the steel industry" he concludes "have a strong interest in future air and space travel, because we are now developing special steels to meet the problems of ultra-high speeds—steels that will resist the heat of air friction and rapid energy release, steels that will provide tensile strength needed to keep craft from exploding in the near vacuum of outer space."

Is Mr. Fairless's picture wholly fanciful? At least it is a beckoning challenge to the new generation, to seize the opportunities and meet the responsibilities of a wider and more spacious life.



## Central

**T**HE seams in the Jamadoba area of India are high in ash content and difficult to wash. In the absence of any coals of higher grade within practicable distance of the steel works, they constitute an important source of supply for the blast furnaces of The Tata Iron and Steel Co. Ltd. Fortunately the iron ore is of high quality and the furnaces can be operated economically with coke containing up to 20 per cent of ash. This grade of coke is obtainable from Jamadoba coals when cleaned to 14-15 per cent of ash.

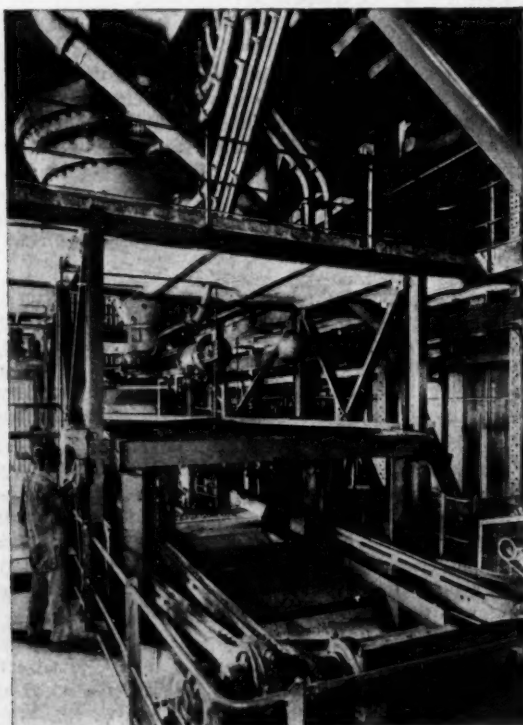
An  $\frac{1}{2}$  in. x 0 fraction can be screened out of Jamadoba coal with an ash content of about 15 per cent. From the 3 in. x  $\frac{1}{2}$  in. oversize a clean coal containing 13-14 per cent of ash is obtainable as float at a specific gravity between 1.40 and 1.45. This, when mixed in with the unwashed  $\frac{1}{2}$  in. x 0 fraction, would give a product containing slightly less than 15 per cent of ash. By taking off a middling at a somewhat higher specific gravity and crushing the

coarser portion, additional coal would be released and the yield of clean coal would be increased correspondingly. There would remain a fine middling with about 30 per cent of ash which could be used locally for steam-raising or for making soft coke for domestic consumption. The Jamadoba plant was designed on the basis of the above characteristics.

The plant was planned for a raw coal input of 300 tons per hour. The coal coming from the pit is transported to three bunkers of 200 tons each. Space has been left for a fourth bunker. Coal is drawn from the bunkers by two travelling Sherwen vibrating feeders, 48 in. wide x 10 ft. long. The feeders deliver the coal to conveyor belt A and thence by conveyors C and D to two primary double-deck shaking screens, which size it at 3 in. and  $\frac{1}{2}$  in. (round holes). The 3 in. oversize goes to apron conveyors E and F where wood, tramp iron, etc., are removed, the coal passing to a 24 in. x 36 in. Pennsylvania single-roll crusher, which reduces it below 3 in. size, dropping it on to conveyor D for return to the primary screens.

The 3 in. x  $\frac{1}{2}$  in. fraction is taken by conveyor G to the Chance cone. The  $\frac{1}{2}$  in. x 0 undersize is elevated by Fraser and Chalmers Redler conveyors H and J. to two Sherwen vibrating screens, each 4 ft. wide x 10 ft. long, fitted with  $\frac{1}{2}$  in. woven-wire screen cloth. The  $\frac{1}{2}$  in. x  $\frac{1}{2}$  in. oversize drops on to conveyor K and joins the 3 in. x  $\frac{1}{2}$  in. fraction on conveyor G, passing with it to the Chance cone. The  $\frac{1}{2}$  in. x 0 undersize, which does not need cleaning, is normally transported by a Redler conveyor AK to conveyor M, dropping on to and mixing with the clean coal from the Chance cone. If required, however, it can be bypassed to a dust bunker for loading into railway wagons.

In the Jamadoba plant the Chance cone is 18 ft. in diameter at the top. It has a slow-speed agitator, running at 6 r.p.m., to give the medium a circular motion. A middlings discharge column of square section is fitted about half-way down the cone, and a refuse discharge chamber is situated at the bottom. Sand and water from the main sand sump are pumped in at the top of the cone at a comparatively high specific gravity. Water is also pumped into the cone at several levels.



Above: Layout of the Jamadoba coal preparation plant

Left: Chance cone, showing water inlet pipes, middlings column, refuse chamber with upper and lower gates and de-sanding screen

Right: Flow of coal at the Jamadoba plant



# Coal Preparation Plant in India

The raw coal is fed into the top of the cone. The clean coal floats on the medium and is carried round by the action of the agitator to the discharge point, where it overflows on to two shaking screens for de-watering and de-sanding. The middlings that collect on the layer of higher specific gravity at the middlings outlet level are carried by a stream of water up the column, which rises to the height of the top of the cone in order to maintain the medium at the level. They overflow on to a de-watering and de-sanding screen similar in design to the clean coal screen.

The refuse chamber discharges the sink material at the rate at which it collects in the bottom of the cone.

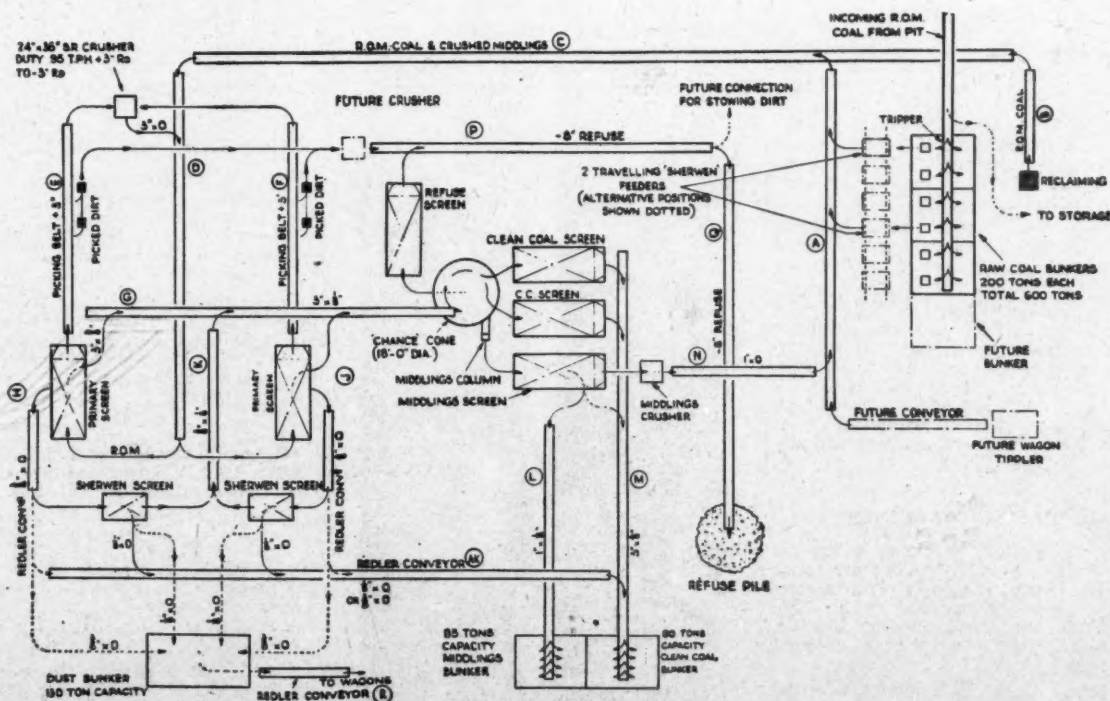
The de-watering and de-sanding screens are similar in design to the raw coal primary shaking screens. From the clean coal and middlings screens the sand and water flow direct to the main sand sump; from the refuse screen they

In pursuance of a long-term policy for ensuring an adequate supply of metallurgical coke for present requirements and future developments, The Tata Iron and Steel Co. Ltd. planned to install central coal preparation plants in districts where suitable coking coals have been found within reasonable distance of the steelworks. One such installation is situated at Jamadoba in the Jharia coalfield, some 200 miles west of Calcutta, where important deposits of coking coal occur. The plant was designed and constructed at the Fraser and Chalmers Engineering Works of The General Electric Co. Ltd. of England, the electrical equipment being supplied by the company's Witten Engineering Works. The buildings and most of the structural work were made and erected locally in collaboration with The General Electric Co. of India Ltd.

drop into a subsidiary sump, from which a sand pump elevates them to a main sump. The sand collecting in the bottom of the main sump is pumped back at a comparatively high density into the top of the Chance cone. Thus, the sand and water circuits are closed and the operation of the cone is fully automatic.

The clean coal from the screens is elevated by a flight conveyor M to a bunker with a capacity of 90 tons, from which it is loaded into railway wagons for transport to the coke ovens at Jamshedpur. The 1 in. x  $\frac{1}{4}$  in. middlings is taken by a second flight conveyor L to a middlings bin alongside the other; provision has been made for it to be by-passed, when required, to the clean coal bunker. The 3 in. x 1 in. fraction of the middlings drops from the upper deck of the screen into a 24 in. x 36 in. Pennsylvania single-roll crusher, which reduces it all below 1 in. size. The crushed middlings are returned to the circuit on conveyors N and A, joining the main stream of raw coal feed on conveyor C. The discharge of the refuse screens is transported by conveyors P and Q to the refuse dump.

The performance of the plant since it was commissioned has fully come up to expectations.



## Machinery and Equipment

### A New Magnetic Separator

Rapid Magnetic Machines, Ltd., announce a new high-intensity, induced roll separator which provides the necessary magnetic field for purification of free-flowing granular materials. A considerable reduction in overall size and wattage below hitherto applicable machines has been achieved.

The basic unit has a 5 in. dia. roll, with two parallel 5 in. feed widths. Several such units may be fitted together to provide a separator with any number

**The "Rapid" type M.J. separator for the treatment of silicates, mildly abrasive powders and small granulated materials**

of rolls for difficult separations, or where selective separation of different materials is required. The equipment is particularly applicable for the purification of such items as silica sand, abrasive grain, corundum, graphite, kyanite and slag.

Purification is dependent upon the material size and magnetic susceptibility, but typical figures are 1½ tons per hour for the purification of silica sands.

In addition to its rugged construction, sealed bearings are used throughout, which ensure long, trouble-free life. Also for ease of maintenance, every part of the separator is either removable or readily accessible. Each magnet coil is rheostatically controlled, thus allowing variation of energy at each roll.

#### FIRE FIGHTING EQUIPMENT

On January 21, 1957, a sample length of Fire Fighter Flex R.R.L. fire hose manufactured by George Angus and Co., Ltd., was despatched to a mining company in West Africa in order that the quality and durability of the hose could be tested by the mine's security police fire squad.

This length of hose was subjected to a considerable amount of rough usage and exposure to weather. During this period 40 in. of rain fell, most of it during the past three months.

Examination reveals very little sign of wear and no evidence of damage to the hose caused by rot; it had every appearance of being the ideal type of fire-fighting hose for this climate. In contrast, the existing hose, although it has been treated with anti-rot compounds, has sadly deteriorated and is now practically useless for fire fighting.

#### SONIC SIFTING MACHINES

Industrial sifting machines which are operated by sound vibrations are to be marketed in the U.K. by a German company. They are suitable for handling chemical fertilisers, powdered metals, abrasives, and many other powdered materials.

The machines, which operate from the normal electric power supply, are being



manufactured under the name Rhewum by Rheinische Werkzeug-U. Metallwarenfabrik GMBH of Remscheid-Luettringhausen. The U.K. agent is John P. Barlow, 114 Wigmore Street, London, W.1.

In these machines agitation of the screen is obtained by means of vibrator units which cause oscillations at a frequency of 100 times per second. This method, it is claimed, provides a greatly increased output and almost eliminates the possibility of clogging the screen.

The machines are being built in three standard sizes, and they can be converted, either before or after installation, to give two or more grades by adding further "storeys" which sift into each other.

The standard models have cast light



alloy bodies which carry the vibrators, screen, feed hopper (with a "dosing" device to ensure uniform flow) and a container for the sifted material. The sifting area of the machine is completely enclosed to prevent dust from escaping.

Each vibrator used for agitating the screen consists of a powerful electro-magnet and an armature which is carried and returned by springs. The armature movement is directly transmitted to selected points of the mesh by a rigid connector. The vibrators are normally made up into adjustable groups of four, one or more of these groups being used according to the size of the screen area.

It is claimed that by using this system of agitation much energy is saved, as the mesh frame and its suspension remain stationary. All energy expended is taken direct to the point where it can be used to the greatest advantage.

#### DANISH CONVEYOR BELTING

The Danish manufacturers of conveyor and elevator belting, Roulunds Fabrikker, Ltd., have commenced selling their manufactures in the United Kingdom. The company specializes in belting for use in the handling of coal, coke, ores, crushed stone, ashes, cement, chalk, cellulose acetates, and other materials.

These beltings are designed in certain cases to resist temperatures up to 392 deg. F., extra oily substances, and extremely abrasive materials. Roulunds' standard of manufacture is claimed as high, and is at least to B.S.S. 490, "Rubber and Elevator Belting", although in the majority of beltings the standard is much higher.

Copies of the handbook relating to these products can be obtained from 44 Tower Hill, London, E.C.3.

#### LIGHTWEIGHT ROCK DRILL

Atlas Copco have introduced a new lightweight rock drill, type BBD.12.LH. This machine, which is based on the original BBD.11.LH., is mainly designed for use in quarries, boulder-blasting, and the drilling of block holes.

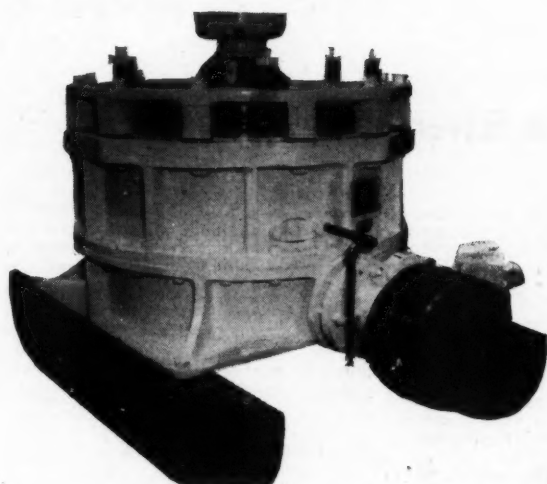
The BBD.12.LH., an air-blown machine, has a front head to cover and protect the rotation chuck. It is equipped with a new type of drill steel holder with rubber buffer. In addition to the standard

**The new lightweight rock drill type BBD. 12 LH. introduced by Atlas Copco (Great Britain) Ltd.**

rotation chuck for ½ in. by 4½ in. drill steel shanks, a chuck for ¾ in. by 4½ in. steels can be supplied.

The model has a piston bore of 1½ in. and a piston stroke of 1½ in. It is 17½ in. long and weighs 24.5 lb. Impacts per minute total 2,650 and air consumption is 46 c.f.m. at 85 p.s.i.





A 36 in. Kue Ken gyratory crusher for exhibition at the British Trade Fair, Helsinki

American experts will be arriving in Ceylon in September to explore the iron-ore resources of the island.

Stockholders of Yuba Consolidated Gold Fields, Yuba Industries, Inc., and Portuguese-American Tin Co. have approved plans for a merger, which became effective on August 1, 1957. The new corporation will be known as Yuba Consolidated Industries, Inc.

The British Colonial Under-secretary has stated in the House of Commons that reserves of bauxite in Jamaica are at present estimated at between 500,000,000 and 600,000,000 tons. Output is expected to increase by 1960 from the current annual rate of 3,300,000 tons to between 700,000,000 and 900,000,000 tons.

The Rhodesian Vanadium Corporation is relinquishing its option on the nickel claims at Bindura, north of Salisbury, Southern Rhodesia. The corporation, a subsidiary of the U.S. Vanadium Corporation, took up a development and purchase option on the claims in January this year.

Under agreements recently concluded between the Government of Newfoundland and Canadian Javelin, Ltd., the Government's 90 per cent holding in the Newfoundland and Labrador Corporation, Ltd. (NALCO), has been acquired by Javelin. With this acquisition, Canadian Javelin has obtained control of approximately 30,000 sq. miles of mineral lands known to contain deposits of lead, zinc, copper, molybdenum, magnesite, fluor spar, nickel and titanium.

Mr. R. L. Garner, president of the International Finance Corporation has announced that the Corporation has reached agreement, subject to completion of the necessary legal formalities, for an investment of the equivalent of U.S.\$600,000 in Engranes y Productos Industriales, S.A., a Mexican company, for the expansion of manufacturing operations. The company is owned by American and Mexican stockholders. The expanded project will represent the first manufacture in Mexico of automotive differential gears and universal joints, hydraulic jacks, and rock drill parts. Pro-

duction of some of these items will start this autumn and all items should be in production next year.

#### PERSONAL

Mr. R. W. Diamond has been awarded the gold medal of the Institution of Mining and Metallurgy for 1956 in recognition of "distinguished services to the mineral industry in Canada".

Taylor-Short and Mason Ltd. have formed a new subsidiary company, Short and Mason Ltd., to handle scientific and meteorological instrument business. The new subsidiary revives the original name. The name of the main company has been changed to Taylor Controls Ltd.

Mr. G. A. Curry, managing director of J. H. Vivian and Co. Ltd., Johannesburg,

has told the U.K. Trade Commissioner in Johannesburg that he is visiting the United Kingdom later this month. Mr. Curry will be seeking agencies for light engineering products, small nuclear energy power plants and ancillary equipment associated with nuclear energy, and specialized proprietary railway equipment.

The British Trade Fair at Helsinki, Finland, is being held from September 6 to 22, inclusive. Among the manufacturers of mining equipment taking part are Armstrong Whitworth (Metal Industries) Ltd., who will exhibit Kue Ken jaw and gyratory crushers, and Merton Engineering Co. Ltd., who will display Merton Overloaders.

#### CONTRACTS AND TENDERS

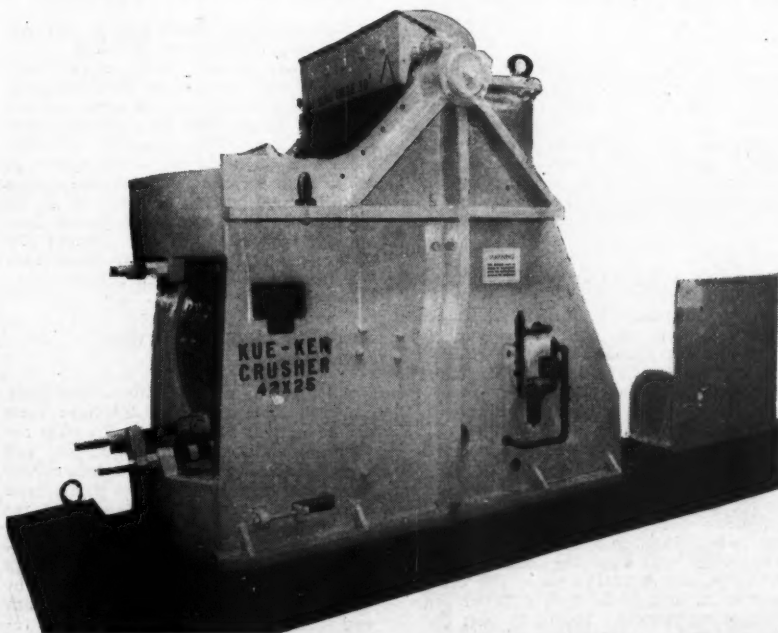
The following future procurements have been announced by the International Co-operation Administration.

##### South Africa

Air compressors, various specifications. Transvaal Provincial Administration. Closing date August 23, 1957. Ref.: E.S.B./19148/57. Telephone Chancery 4411, extension, 738, or 771.

##### Chile

Pumps and associated electrical equipment. Ten 26563 of June 26, 1957. Closing date now August 23, 1957. Ref.: E.S.B./15665/57. Telephone Chancery 4411, extension 738 or 771.



The 42 in. by 25 in. Kue Ken jaw crusher to be exhibited at the British Trade Fair in Helsinki

## Metals and Minerals

# U.S. Interest in Volta River Project

As previously reported in *The Mining Journal*, an American group visited Ghana a few months ago to make a study of the Volta River project. On May 9 the Ghana Government announced that the group had been given until July 18 to enter into negotiations for the implementation of the scheme.

On July 31, the Ghana Development Commission issued a statement that it had not received a specific proposal concerning the Volta River project from an American group. The Commission says that "it feels itself under no further obligation to that group, but would be willing to consider proposals from it or any reputable interests which might wish to consider participating in the scheme."

A representative of the New York investment firm of Winslow, Cohn and Stetson, which with Utah Construction and a group of construction firms in Houston (Texas) had been given permission to survey the commercial and economic aspects of the project, has confirmed that his company is still interested, despite the fact that the Ghana Government has withdrawn its offer of first refusal. It was pointed out that the time allowed—only 90 days—was too short for raising the minimum of \$450,000,000 which is regarded as essential for harnessing the Volta and manufacturing aluminium from local bauxite deposits. The group is confident that the money can be raised, but they have not yet succeeded in obtaining the services of an aluminium company competent to handle the production side of the project. Major U.S. aluminium companies are reported not to be interested because of commitments elsewhere and the present situation of plentiful supply. Alcan, according to the spokesman of the U.S. group, has also expressed no interest. The U.S. group attaches no importance to the withdrawal of Ghana's offer, believing that little competition is likely to be experienced.

Despite the optimism expressed, it would appear that there are still considerable hurdles to be surmounted before specific proposals can be submitted to the Ghana Development Commission.

## FRENCH MANGANESE PROJECT

Plans to raise 23,500,000,000 French francs to mine and ship manganese ore from the Franceville deposits in French Equatorial Africa will be put before shareholders at an extraordinary general meeting of the Compagnie Minière de L'Ogoue (Comilog) on September 20. The main task in this project, which will be the first step taken by the company towards active exploitation of the deposits, will be the construction of an 80-kilometre overhead cable railway from the mine, linked to a 280-kilometre railway, which will carry the ore to Pointe-Noire on the Atlantic coast. The ore is said to be high-grade with a 50 per cent manganese content. It will be part processed locally. Present plans provide for an initial yearly output of 500,000 tonnes, rising to 800,000 tonnes in a few years.

A scheme to produce ferro-manganese, using power from the projected Kouilou Dam in French Equatorial Africa, is also under study.

\*

The downward drift in manganese ore shipment prices still shows no signs of halting. Lower freights have undoubtedly played their part in bringing down prices, but the prevailing paucity of demand, largely seasonal, has been a contributory factor. For good ferro-grade 46/48 per cent material, a price range of 120d. to 132d. per 1 ton unit c.i.f. Europe is now indicated. Prices reached their peak early this year, when they ranged from 135d. to 150d., due mainly to the outcome of the centralization of the ore trade by the Indian Government, higher export duties from that country, and Suez Canal considerations.

Demand normally picks up in the autumn, as users begin looking to their future requirements, but the extent of the pick-up may be conditioned by the stocks which are still being held. In the U.K. stocks of high-grade ore are reported to be satisfactory. Rather similar conditions are reported from the U.S., where inventories and supplies already contracted for are expected to take care of users' needs for some time yet.

Brazilian ore is steadily becoming a greater force in the market; production is now at a rate of more than 500,000 tons annually and is still rising. The view has been expressed that, as time goes on, it could well oust Indian material from the U.S. market.

## NICKEL FROM U.K. STOCKPILE

Reflecting the easier supply position obtaining for nickel, the British Board of Trade have made an agreement with Mond Nickel under which the latter company will offer for sale as agents of the Board of Trade 1,600 tons of nickel pellets from the strategic stockpile reserves. Sales will be made for consumption in the U.K. at the company's normal selling price of £600 per ton and will, as far as possible, be spread over the period September, 1957, to June, 1958. About 500 tons of the total allocated for distribution will be offered in the near future.

## NEW PROCESS RECOVERS COLUMBIUM

Attempts to recover columbium from low-grade Arkansas bauxites have been proceeding for some years. Progress reports have always been encouraging but very little results in terms of columbium have been produced. However, a report from Reuters this week states that research workers of the U.S. Bureau of Mines have developed a process to recover columbium and other valuable by-products from certain domestic sub-marginal titanium deposits. Columbium and iron are reported to have been recovered simultaneously with titanium from several low-grade Arkansas materials during tests at the Bureau's

laboratories at Rolla, Missouri, which included two titanium minerals, brookite and rutile, and two types of alumina plant wastes containing titanium minerals.

Essentially the process consists of first smelting a concentrate with coke to produce a coherent sinter, and then chlorinating the sinter at low temperature followed by fractional distillation to recover titanium, columbium and iron.

## U.S. URANIUM OUTPUT

The U.S. expects that its present domestic production of uranium oxide will be almost doubled by the end of 1958, according to the 22nd semi-annual report of the Atomic Energy Commission.

Production of uranium oxide concentrates from 12 privately owned mills during the first half of 1957 totalled 4,200 s.tons, compared with 3,400 tons in the last half of 1956. The 12 mills have a capacity of 9,210 tons of raw uranium ore a day, which yields on the average about 23 tons daily of the refined oxide. Ten more processing mills are either planned or under actual construction. The two categories of mills, operating and projected, will together handle 18,305 tons of raw uranium ore a day. This would increase production of the oxide to about 45 tons a day—almost double the present rate.

Production of raw uranium ore declined in the first half of this year to about 1,620,000 tons, compared with 1,660,000 tons for the second half of 1956. No significant new uranium producing area was discovered in the period covered in the report, and the number of producing mines remained about the same.

\*

West Germany has signed a contract with the U.S. for the purchase of over 5,500 lb. of enriched uranium. Germany also plans to buy from Canada uranium concentrates and metallic uranium corresponding to a quantity of 100 tons of uranium metal annually over five years. Exploratory talks have been in progress.

\*

The establishment of an O.E.E.C. uranium processing plant has been recommended by a group set up in the autumn of 1956 by fourteen O.E.E.C. countries to consider the possibilities of such a plant.

## NORWEGIAN TITANIUM ORE

Experiments undertaken by Titan A/S are reported to have arrived at a process by which the iron content of titanium ore mined in the Jössingfjord district of Norway can be extracted, producing at the same time concentrated titanium of high oxide content. The ore at present exported from this district contains 44 per cent titanium oxide and 35 per cent iron. In 1957, the export of ore is expected to reach 200,000 tons or 12 per cent of the total world production.

## STANDARDS FOR NEW METALS

It is anticipated that A.S.T.M. standards for zirconium will be published next year as a result of present activities of Committee B-2 on Non-Ferrous Metals and Alloys of the American Society for Testing Materials.

Active committee groups are to consider standards for beryllium, columbium,

tantalum, thorium, uranium and hafnium.

New groups are being formed to look into the need for standardisation of molybdenum and tungsten metals and alloys.

The committee has organized a sub-committee to consider specifications for titanium alloys and to review the present specifications for titanium metal and titanium sponge.

## COPPER • TIN • LEAD • ZINC

(From Our London Metal Exchange Correspondent)

Since the last report markets have maintained a steady undertone in spite of the holiday season and reports are that consumer demand is slackier than usual. It is possible that some of the main factors for the steadiness in quotations are the monetary troubles now being experienced by France, the possibility of revaluation in Germany, and the tendency for sterling to weaken both against the dollar and the German mark.

## COPPER'S UNCERTAIN OUTLOOK

The copper market has had to adjust itself to a reduction in the R.S.T. price to £210 per ton and a weakening of the scrap price in America, although the latter has not yet resulted in a lower quotation by the Customs Smelters which remains at 28½ c. per lb. and the

U.S. export price has fallen to 26½ c. per lb. f.a.s. In spite of the apparent over-production both Sir Ernest Oppenheimer and the chairman of the Copper Department in Chile have said in public statements that they think the present price level for copper is too low and that a reasonable improvement will be seen before long.

On the L.M.E. the contango has contracted slightly, which is due entirely to technical considerations, as stocks in official warehouses rose a further 99 tons last Monday. The immediate outlook is still uncertain with the probability that prices will fall in the near future, as new business both in Europe and in America is non-existent and demand is not expected to increase until the turn of the month. Some quarters point out, however, that it would only require a

change in sentiment for the price level to rise several pounds.

## CONTANGO IN TIN

The feature of the tin market has been the establishment of an appreciable contango and with stocks in official warehouses a further 231 tons up this is now expected to continue, although if the Buffer Stock Manager commences to buy cash metal the position could change very quickly. Demand both in America and Europe has been at a very low ebb but a number of sources seem to think that with the coming of the autumn the position will alter to such an extent that an appreciable price rise will be seen. In the meantime, exports of tin from Malaya continue at an unchanged level with 5,223 l.tons being exported in July against 5,128 tons in June. On Thursday morning the Eastern price was equivalent to £756½ per ton c.i.f. Europe.

## MOUNTING LEAD AND ZINC STOCKS

The lead market has been absolutely featureless with the quotations remaining almost stationary, and here again it is felt that any increase in demand will see a rise in price. In the U.S. the primary refiners output in May was some 10 per cent less than in April, but with delivery to consumers being less, producers stocks continued to rise rapidly and at the end of May these amounted to 46,000 s.tons, being an increase in stocks of some 49 per cent in two months.

The zinc market, on the other hand, has had a firmer undertone with demand being slightly better, possibly due to purchases by the automobile industry in preparation for the New Year's models due in the autumn. In the U.S. although production in July was some 5,000 tons less than in June, deliveries decreased to such an extent that the stocks at the end of July amounted to 146,153 s.tons against 133,455 s.tons at the end of June.

The outlook for both the lead and zinc markets in London is dependent upon the introduction or otherwise of additional duties in the U.S. and the latest news is that although Congress may adjourn in about 10 days' time, there is a possibility that the Bill concerning sliding tariffs may be passed. If it is, it is probable that there will be a sharp reaction in the sterling price of both metals, although most quarters think that this would only be of a very temporary nature.

Closing prices and turnovers are:

## THE WEEK ON THE L.M.E.

	Aug. 8		Aug. 15	
	Buyers	Sellers	Buyers	Sellers
<b>COPPER</b>				
Cash .. .. .	£209½	£209½	£213½	£213½
Three months ..	£212	£212½	£215	£215½
Settlement ..	£209½		£213½	
Week's turnover	5,750	tons	4,900	tons
<b>LEAD</b>				
Current ½ month	£91½	£91½	£93½	£93½
Three months ..	£91½	£91½	£93½	£93½
Week's turnover	2,400	tons	4,375	tons
<b>TIN</b>				
Cash .. .. .	£738½	£739	£745½	£746
Three months ..	£739	£739½	£745½	£746
Settlement ..	£739		£746	
Week's turnover	530	tons	780	tons
<b>ZINC</b>				
Current ½ month	£72½	£73	£75½	£75½
Three months ..	£72½	£72½	£75	£75½
Week's turnover	3,725	tons	5,900	tons

## LONDON METAL AND ORE PRICES, AUGUST 15, 1957

## METAL PRICES

Aluminium, 99.5%, £197 per ton  
Antimony —  
English (99%) delivered, 10 cwt. and over £210 per ton  
Crude (70%) £200 per ton  
Ore (60%) bases 2½s. 0d./22s. 0d. nom. per unit, c.i.f.

Arsenic, £400 per ton  
Bismuth (min. 1 ton lots) 16s. lb. nom.  
Cadmium 12s. 0d. lb.  
Cerium (99% net), £13 18s. lb. delivered U.K.  
Chromium, Cr. 99% 7s. 2d. lb.  
Cobalt, 16s.-19s. lb.  
Germanium, 99.99%, Ge. kilo lots 3s. 4d. per gram  
Gold, 251s. 4d.

Iridium, £27/29 oz. nom.  
Lanthanum (91/99%) 15s. per gram  
Manganese Metal (96%-98%) £310  
Magnesium, 2s. 5½d. lb.  
Nickel, 99.5% (home trade) £600 per ton  
Osmium, £20/22 oz. nom.  
Osmiridium, nom.  
Palladium, £7 10s./£8 0s. oz.  
Platinum U.K. and Empire Refined £31/£34 oz.  
Imported £28 10s./£29 10s. nom.  
Quicksilver, £86 ex-warehouse  
Rhodium, £42 oz.  
Ruthenium, £15/£17 oz. nom.  
Selenium, 75s. nom. per lb.  
Silver, 78½d. f. oz. spot and 78½d. f'd.  
Tellurium, 15s. 16s. lb.

## ORES AND OXIDES

Bismuth .. .. .	30% 5s. 0d. lb. c.i.f.
Chromes Ore—	20% 3s. 3d. lb. c.i.f.
Rhodesian Metallurgical (semifriable) 48%	£19 5s. 0d. per ton c.i.f.
" Hard Lumpy (43%) .. .. .	£19 5s. 0d. per ton c.i.f.
" Refractory 40% .. .. .	£18 0s. 0d. per ton c.i.f.
" Smalls 44% .. .. .	£18 0s. 0d. per ton c.i.f.
Baluchistan 48% .. .. .	£12 0s. 0d. per ton f.o.b.
Columbite, 65% combined oxides, high grade	185s./197s. 6d. per unit
Fluorspar—	
Acid Grade, Flotated Material .. .. .	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% Ca F <sub>2</sub> ) .. .. .	156s. 0d. ex works
Lithium Ore—	
Petalite min. 3½% Li <sub>2</sub> O .. .. .	47s. 6d./52s. 6d. per unit f.o.b. Beira
Lepidolite min. 3½% Li <sub>2</sub> O .. .. .	47s. 6d./52s. 6d. per unit f.o.b. Beira
Amblygonite basis 7% Li <sub>2</sub> O .. .. .	£26 5s. per ton f.o.b. Beira
Magnetite, ground calcined .. .. .	£28 0s./£30 0s. d/d
Magnetite Raw (ground) .. .. .	£21 0s./£22 0s. d/d
Molybdenite (85% basis) .. .. .	8s. 5d. nom. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO <sub>2</sub> (prompt delivery) .. .. .	£50/£53 per ton c.i.f. Aust'n
Ilmenite 52/54% TiO <sub>2</sub> .. .. .	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%) .. .. .	108s. 0d./115s. 0d. per unit c.i.f.
Manganese Ore Indian	
Europe (46%-48%) basis 130s. freight plus 5% surcharge	131d./133d. per unit c.i.f.
Manganese Ore (43%-45%) .. .. .	106d./108d. per unit c.i.f.
Manganese Ore (38%-40%) .. .. .	100d./102d. per unit
Vanadium—	(including duty)
Fused oxide 90-95% V <sub>2</sub> O <sub>5</sub> .. .. .	£12½-£13½ per unit c.i.f.
Zircon Sand (Australian) (65-66% ZrO <sub>2</sub> ) .. .. .	£19 per ton c.i.f.



## Mining Finance

# A New Mining Finance House

Rand American Investments (Proprietary) Ltd., a new South African private company, is in the process of being formed for the purpose of taking over the Central Mining and Investment Ordinary and Preference shareholdings recently acquired by a consortium of mining and banking interests.

The original equity of the new company will be £3,500,000 but there will be suitable provisions made for such further finance as may become desirable.

The initial subscribers to this company in alphabetical order will be Anglo American Corporation of South Africa, Baker and Co. Incorporated, Thos. Barlow and Sons Ltd., a banking group consisting of Messrs. Robert Benson Lonsdale and Co., N. M. Rothschild and Sons, J. Henry Schroder, International Nickel Co. of Canada and Union Corporation. Mr. C. W. Engelhard is to be chairman, Mr. R. B. Hagart deputy-chairman and Mr. T. P. Stratten managing director. Other participants will have appropriate seats on the board.

The participation of Baker and Co. Inc., which is one of the companies in the Engelhard Industries group, and that of International Nickel Co. of Canada, will constitute a new dollar investment in the Union representing thereby the confidence of these companies in this enterprise and in the future of South Africa.

Rand American Investments will initially own virtually the entire preference share capital of Central Mining plus a substantial block of ordinary shares. Additionally, arrangements also exist for it to acquire a substantial block of shares in Rand Mines Ltd.

Beyond this, the new company will consider entering into various new developments in Southern Africa which may be sponsored by Central Mining-Rand Mines, members of the new company, or which may arise from other sources. After the company has been formed it will offer participation, together with a seat on its board, to the Central Mining-Rand Mines Group.

## INCO'S LOWER EARNINGS

The International Nickel Company of Canada's earnings per share in the first six months of 1957, were lower than those achieved in the corresponding period a year ago. Actual figures contained in the company's interim financial report shows earnings of \$45,601,000, equivalent to \$3.12 per common share against \$51,772,000 or \$3.48 per common share in the same period a year ago.

Dr. John F. Thompson, chairman, in his letter to shareholders, said that there are at present unmistakable signs that the supply and demand position for nickel is tending to equilibrium more rapidly than had been anticipated. Moreover, by 1961, Free World production capacity would be at 650,000,000 to 675,000,000 lb., an increase of 130 per cent over 1951. More important, it would mean that there will be over 75 per cent more nickel avail-

able for civilian use than was the case last year. This is assuming that the defence demand remains at its present level and that nickel is not taken in 1961 for government stockpile.

In any event, the major task confronting all producers is to develop larger market outlets and further permanent profitable uses for nickel. Inco has a long and successful history of experience in these matters but the task of closing the gap between present total annual consumption of 185,500 s.tons and the projected total annual production of 387,500 s.tons certainly qualifies as a most formidable sales task.

## ALUMINIUM LTD. HIGHER EARNINGS

Group earnings of Aluminium Ltd. for the six months ended June 30, showed sales and operating revenues at \$233,535,395 compared with \$225,392,722 for the first half of 1956. Net income during this period was \$26,547,813 against \$24,797,657 in the corresponding period a year ago. Net earnings are equivalent to 88 c. per share against 83 c. per share based on shares outstanding at the end of each period and after giving effect to a 3 for 1 sub-division which became effective on May 4 this year. Net income of Aluminium Company of Canada, whose

## LONDON MARKET HIGHLIGHTS

For most of the week to August 14, the Kaffir market continued to pursue its course of steady indifference to outside influences. Prices were, in the main, little tested and business began to dwindle until on Tuesday surprised jobbers found themselves hastily marking up prices all round as a sudden burst of buying uncovered many short positions. The steepness of the rise was largely a result of the lack of stock, but the buying that touched off the boom resulted from several factors. *De facto* devaluation of the franc, while failing to stimulate much Paris buying on account of the lack of sterling available to French operators, drew attention to the weakness of many European currencies.

At home, gilt-edged prices weakened disturbingly and with the International Monetary Fund meeting looming ahead next month it was no surprise that many felt that matters were coming to a head and this could certainly do no harm to gold producers' shares. Consequently, with other markets being at best subdued, money has begun again to flow towards Kaffirs.

Gains have been spread throughout the list and are often substantial. Among the many, St. Helena (29s. 3d.) have been prominent; recent Cape demand has now been reinforced by local buying. Similarly, Riebeck (13s. 9d.) continue to rise, being helped by further talk of good developments in the haulages being driven into the property from Loraine. Free State Saaiplaas (13s. 6d.) have, rather illogically, followed in their wake. Other notably firm spots have included Crown (20s. 9d.), Daggas (31s.), President Brand (54s.) and Steyn (27s. 9d.). Finance issues have also been strong with particular interest centred in Anglo American (135s.), "Johnnies" (55s.) and Central Mining (66s. 3d.). West Rand Investment Trust (39s. 6d.), however, have been subdued by the latest financing news.

Potgietersrust Platinums (13s.) have steadied after their recent fall on the metal price cut, but others have shown

little improvement. In diamonds, weakness on Wall Street has been reflected in De Beers, now firmer at 105s. 7½d.

Transatlantic influences have generally depressed dollar stocks and the premium on these is now back to 1½ per cent against an unofficial rate of 20 per cent reached only recently. One sufferer in this category has been International Nickel. News of a Board of Trade nickel release, coupled with doubts about the longer-term outlook for the metal in the light of rapidly expanding production, has impinged on lower Inco earnings in the second quarter of this year. International Nickel have thus fallen over the week from \$187½ to their lowest this year of \$179.

West African and Australian golds have not, so far, really responded to the rise in Kaffirs, but Ashanti have remained firm at 23s. 3d. Elsewhere, dealings in Afrikander Proprietary have been prohibited by the Stock Exchange Council. Rumour has it that irregularities have arisen in dealings on the Johannesburg market.

Tins have been firm enough, but without real feature. A revival of Eastern inquiry has helped in several instances Tanjong, exceptionally, having drifted down to 19s. 3d. on the declining trend of production seen in recent months. Beralt have fallen to 42s. 9d. on fears of a lower final dividend. Coppers have not been helped by the course of metal prices, but there have been no severe falls and a marked revival—partly technical—has begun to develop.

Lead-zincs have stayed in the doldrums, some unexplained weakness showing up in Consolidated Zinc (71s. 9d.). Elsewhere, St. John d'El Rey staged one of their periodical outbursts. Once again, hopes that a deal may yet be done over the company's iron ore deposits provided the inspiration for speculative demand. At one time buyers lifted the price several shillings to 52s. 6d.; there was no follow-through to the buying, however, and profit-takers have now brought the shares back to 50s.

accounts are consolidated with those of Aluminium Ltd. for the half-year was \$19,861,224 compared with \$16,618,599 last year.

Commenting on the results, Mr. N. V. Davis, the president of Aluminium Ltd., stated that primary aluminium production at the company's Canadian plant was 304,515 tons compared with 249,915 tons a year ago when operations were seriously curtailed by an abnormal water shortage. This year operations have been adversely affected by the strike at the company's largest smelter at Arvida, Quebec, on May 17 and which is still in progress. While the strike at Arvida added to the cost of sales during the second quarter it had little impact on sales because, prior to its commencement, production had been running in excess of sales resulting in the creation of a substantial inventory of aluminium. The full cost of the strike has not been absorbed in the results for the first six months of 1957.

Smelter facilities bringing the company's total Canadian ingot capacity to 850,000 tons per annum have been authorized and should be completed by the end of 1958. Timing of the installation of additional smelter facilities will be reviewed from time to time in the light of market and other conditions.

Dividend disbursements in the first six months of 1957 were the equivalent of \$12,266,726 compared with \$11,444,373 in the same period last year. A quarterly dividend of U.S. 22½ c. per share is payable on September 5 to shareholders of record August 5, 1957.

#### THE ORANGE FREE STATE GOLDFIELD

Since January 1, 1947, when shaft-sinking operations began at St. Helena, stories, authentic and bizarre, but always imaginatively provocative, have come from Africa describing the development and establishment of the Orange Free State goldfield.

Formally, the stories didn't matter but the fact they reflected was the greatest single programme of mining, planning and development in the history of South Africa. Yet, even now, the names of individual goldmines or of the new towns like Welkom, Virginia and Allanridge reflect only a quiet recognition of a venture which has been the means of cir-

culating new wealth throughout the Union, attracting fresh capital from abroad, and raising South Africa's national income by many millions of pounds.

The profound significance of the development of the Orange Free State goldfield in South Africa's history is the central theme running through a new booklet, *The Orange Free State Goldfield*, published by the Anglo American Corporation of South Africa.

Perhaps its most penetrating impression is the way in which it depicts by word and by illustration the life of the native mineworkers whose wide amenities ought to do much to dispel preconceived notions of what their lot must be.

Nevertheless, the business of winning gold on a grand scale is not neglected and the fact that over £230,000,000 has been spent on capital development on the goldfield which should essentially yield 350,000,000 oz. of gold worth £4,344,000,000 speaks volubly.

The booklet may be obtained free of charge on application to the Anglo American Corporation of South Africa Ltd., 40 Holborn Viaduct, London, E.C.1.

#### UNION MINIERE TO FINANCE ITS OWN EXPANSION

Union Minière, the big Belgian Congo base metal and uranium producer, expects to complete its programme of renovation and extension without raising fresh capital, stated M. Edgar Sengier, chairman, at the annual general meeting in Brussels. However, certain new ventures as well as the power plants necessary for their operations would be financed in part by means of new capital loans. This will involve a high amortization rate which eventually would lead to higher production costs.

With regard to copper Mr. Sengier said that if basic copper statistics already published accurately reflected the supply/demand picture, he felt there were good reasons to be optimistic about the future consumption and price of the metal. In any event, owing to the company's several long-term contracts Union Minière's copper production was being sold on a regular basis.

Tanganyika Concessions has a substantial interest in Union Minière.

#### KAY TIN MINES (KINTA) LIMITED

The Ordinary General Meeting of Kay Tin Mines (Kinta) Limited was held on August 2 in London.

Mr. C. A. Bolton, chairman, in the course of his speech, said:—During the year under review the Company was able to arrange for three separate contractors to work over certain areas of the old Menglembu Leases, but not until the latter part of the year. The tin returns were not large but a good deal of ground was prepared for sluicing which has enabled the contractors to continue work more actively this year. During the last six months the contractors have extracted tin ore to the value of 68,230 M. dollars, or roughly £7,950, from which sum the company has received its tribute allowance of £790. They are now getting down below the previously worked out part of the mine and are still getting payable results.

We are proceeding with the exploratory

work on the Chenderiang Leases, where we have already carried out an extensive boring programme. The tin values shown were such as to justify your Directors in contracting with an important firm of Mining Engineers in Malaya who have continued check boring over the past four months. We are informed that 151 bores have been sunk for a footage of 11,604 ft. Boring is continuing and we hope shortly to receive further and final reports from the engineers.

The future prospects of the Company depends largely on whether the evaluation of the Chenderiang tin bearing leases will justify negotiations for the disposal of the leases on satisfactory terms.

When final reports and valuations are received by the Directors, shareholders will be advised.

The Report was adopted.

#### Financial News and Results

**Central Mining Free State Areas to Liquidate.**—Under this heading in the *Mining Journal* for August 2 it was stated that Central Mining Free State Areas' holding of Harmony was equivalent to three Harmony for every two C.M.F.S.A. This should have read "three Harmony for every twenty C.M.F.S.A."

**A Bigger Carrot on a Longer String.**—Glazer Bros., the Johannesburg finance house, have extended their 13s. 3d. bid for London and Rhodesian until September 10. Should the offer become unconditional, Glazers will make a further *ex gratia* payment of 1s. 3d. in respect of all existing and future acceptances.

**Consolidated Tin Mines of Burma.**—In view of the Bank of India's guarantee to satisfy outstanding creditors up to a sum of £50,000, the court has sanctioned a reduction of capital by Consolidated Tin Mines of Burma. It is proposed to return 3s. per 5s. share to be satisfied by transfer of shares in another company which has been formed to take over the company's assets outside Burma.

**London, Australian and General Exploration.**—In the year to April 30, 1957, London, Australian and General Exploration earned a net taxed profit of £8,627, against £22,550 in the preceding year. However, the comparison is not valid, since the 1956 profit includes non-recurring items amounting to £21,605. The dividend is maintained at 2½d. per share, and the carry-forward is increased to £4,966. The company announces that its subsidiary, L.A.G. (South Africa), has acquired an interest in Wandrag Asbestos who hold mineral rights over 13,000 acres in the Kuruman district of Cape Province, where, it is believed, there are large quantities of good quality asbestos deposits. The meeting will be held in London on August 26, Mr. A. Hedley Williams in the chair.

**Gopeng and Pengkalen—Concluded.**—The Court has now sanctioned the returns of capital by Gopeng Consolidated and Pengkalen and the distributions (of 1s. 6d. and 4s. per share respectively) will be made "in early course".

#### CANADA

Opportunities exist in the expanding Petroleum and Metal-Mining Industries in SASKATCHEWAN for qualified personnel in the under-mentioned categories. Both Government and Industrial posts are available.

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## THE CENTRAL MINING & INVESTMENT CORPORATION

### SATISFACTORY RECORD OF PROGRESS

#### LORD BAILLIEU ON CHANGES IN ADMINISTRATION POLICY

The Annual General Meeting of The Central Mining & Investment Corporation Ltd. was held on August 13 1957 at Winchester House, Old Broad Street, London, E.C.2.

The Chairman, **The Rt. Hon. Lord Baillieu, K.B.E., C.M.G.**, presided, and said:—

Ten weeks ago, in a statement at the Extraordinary General Meeting of the Company, I sketched the background against which your affairs had been conducted since the summer of 1956. In the Corporation's report which was sent to you on July 22—3 weeks ago—further details were added to the narrative of events. You were given notes on the principal companies in which your assets are invested and we set down the figures relating to the profit, assets, liabilities and net worth of your Corporation for the 15-month period since the end of the last accounting period. I do not want to take up your time to-day by going over the same ground but would like instead to tell you how we face the future—how we see its problems and the plans we have for meeting them. As a starting point, let me summarize in figures the position of the Corporation as compared with earlier years. Five years ago your net assets at book values were £10.2 million; at March 31 last they were £13.4 million. Measured by Stock Exchange prices—where applicable—they were respectively about £15 million and £23 million. During the same period annual dividend distributions have increased from £500,000 to £800,000. I suggest this is a satisfactory record especially bearing in mind that we are a mining finance house whose principal assets are by their nature "wasting assets" and whose dividend income must include a substantial element of capital repayment. It also covers a period during which the older Gold Mines have—through the fixed gold price and rising costs—had to face contracting profit margins. In your case, your dividend has increased by 60% and your assets have substantially improved in value.

#### The Future

As to the future, the first problem is financial—that is, where should the Group's investments lie? Ten years ago the portfolio was spread approximately as follows:—

The Union of South Africa .....	69%
Western Hemisphere .....	21%
The United Kingdom .....	9%

On June 30 last year, before the Trinidad Oil Company sale was completed the division was:—

The Union of South Africa .....	47%
Western Hemisphere .....	40%
The United Kingdom .....	11%

On June 30 this year Central Mining Finance Limited had by way of shares in and loans to other companies:—

64% in South Africa
11% in Western Hemisphere
and 23% in the United Kingdom.

In addition to these shares and loan investments you have, of course, substantial other net assets principally in the form of Government securities both in the United Kingdom and in the Union

of South Africa, so that in total at June 30 this year, 53% of your assets were outside South Africa and 47% in South Africa. Our view is that while maintaining our traditional investment position in South Africa, we should also place funds in any other sectors of the Commonwealth where economic expansion seems probable and we have in mind particularly Canada, the Rhodesias and Australia. We do not think it wise to "rush" this policy but investment opportunities are continually being sifted in accordance with the principles—which I put before you on May 30—of balancing immediate and future revenue prospects and maintaining adequate liquid resources.

#### Transfer of Operational Supervision

This brings me to the question of how our investments in other countries should be held and thence logically to the operational side of our business and how that can best be run in present circumstances. This is the other chief problem for the future. As you are aware our interest in Canadian oil is held through a Canadian subsidiary Centramic Ltd., which, while wholly-owned by Central Mining Finance Ltd. here as regards share capital, is nevertheless administered in Canada. This may well be the pattern we should follow with new investments in other countries as well. We cannot, for various reasons, transfer the whole of our existing South African assets to a subsidiary in that country, but we can transfer the operational supervision of them, and this is now being arranged with our associates in Johannesburg—Rand Mines Limited.

#### Arrangement With Rand Mines Ltd.

Since the beginning of the century the affairs of the Central Mining/Rand Mines Group of mining and industrial companies in South Africa have been administered from Corner House in Johannesburg. Corner House has been and is the South African headquarters of Central Mining and also the Head Office of Rand Mines Limited, a South African company in which we have always had a substantial but never a controlling share interest. The staffs of the two companies are separate but work closely together and enjoy various benefits—such as Pension and Insurance Funds—in common. Rand Mines provides Secretarial services to the Group companies while Central Mining provides technical and managerial services through its Johannesburg organization headed by its resident General Manager. Thus, at present, the Consulting Engineers, the Consulting Electrical and Mechanical Engineer, the Consulting Metallurgist, the Consulting Geologist, together with their departmental staffs are all full-time employees of Central Mining, from whose managerial staff are drawn also the Chief Executives of the mines and other companies of the Group. This relation between the Group companies, Rand Mines Limited and Central Mining has existed for over 50 years; it has been a most happy one and beneficial to all concerned. It has, however, become apparent in recent years that there were some disadvantages in a system whereby technical and managerial services for a number of important South

African companies were provided by a British company with its head office 6,000 miles away in London.

#### Proposed Alterations

We have for some time had under consideration plans whereby, without detrimental effect to any of the parties concerned, Rand Mines Limited should take the place of Central Mining in supplying these services to the Group companies. I am now glad to tell you that subject to the approval of H.M. Treasury and to the concurrence of the Boards of the Group companies concerned Rand Mines will as from September 1 assume—in addition to its Secretarial duties—the managerial and technical responsibilities towards our mining and industrial Group companies which now rest on Central Mining. For this purpose the appropriate personnel have been invited to transfer from Central Mining to Rand Mines. We shall continue to provide financial services to the Group and will maintain direct links through Board representation with the companies comprising it. We shall also maintain our position as the largest shareholder in Rand Mines and participate in the executive direction of that company.

#### Tribute to Staff

We retain, of course, all our shareholdings under our own direction with facilities in Johannesburg and London for dealing in securities. On the financial side, the agreement which has been drawn up between Rand Mines and ourselves will, under present conditions, result in each company receiving as nearly as possible the same net revenue as each derived from its administrative services in the calendar year 1956. You will realize that the reorganization involved could not be put into effect without the greatest goodwill between the staffs of Rand Mines and Central Mining and I would also like to pay a most sincere tribute to them all. Especially, I want to express, on behalf of my board—and I am sure, of all shareholders—our gratitude to the Central Mining staff who will be leaving our service; they have served you loyally and well. They will know that they will be joining an organization with which they have always been intimately associated and which is destined to play an important role in the future development of the Group in South Africa.

I have explained in detail the projected transfer of responsibilities from Central Mining to Rand Mines on the technical and management side in South Africa. Your other interests are in no way affected by this re-organization and will remain under the direct control of the Board in London.

#### Additions to Board

Your Board has recently been enlarged and strengthened through the inclusion of Mr. R. F. Medlicott—a director of Robert Benson, Lonsdale & Co. Ltd.—and of Baron Elie de Rothschild—a partner in de Rothschild Freres of Paris. It is our intention to invite Sir Ernest Oppenheimer and Mr. G. V. Richdale to join us as representing the consortium of interests which has become a substantial holder of Preference and Ordinary capital in the Corporation.

Before passing to the formal business of the Meeting I would mention that since your Company's financial year now ends on March 31 dividend distributions on the Ordinary share capital will normally be made in March and August.

The report and accounts were adopted.



